

## King County Tabula: Task 4-Escalation Rate

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This memorandum pertains to Work Order #9 of King County Wastewater Treatment Division for revisions and updates to their "Tabula" Cost Estimating Program. Specifically, this memo discusses Task 4, Review and Test Tabula's cost calculating parameters for escalating factors. The suggestions and recommendations presented in the memo will be reviewed by King County then discussed and approved for inclusion in the Tabula program.

Escalation factors in Tabula are used for two purposes. The first is to bring database costs in the program up to current dollars at the time of estimate preparation. The other purpose is to adjust estimate costs developed through Tabula into future dollars as appropriate for the specific project construction schedule.

For the first purpose, Tabula currently uses the *Engineering News Record* (ENR), Construction Cost Index (CCI) for the Seattle area to bring the database unit costs up to current dollar value. The ENR index is widely recognized and used for this purpose in the construction industry. The ENR publishes two indices based on 20 cities throughout the United States, of which, Seattle is one. These indices are the Construction Cost Index (CCI) and the Building Cost Index (BCI). BCI is based on building type projects and the CCI is typically used for heavy construction and civil type projects for which Tabula is used. The CCI for each of the 20 cities is based on 200 hours of common labor at local rates, 25cwt of fabricated standard structural steel at the 20-city average price, 1.128 tons of bulk Portland cement priced locally and 1,088 board feet of 2x4 lumber priced locally.

Because the ENR CCI is based on the greater Seattle metropolitan area construction economy, labor and material costs, widely used by the industry, readily available and updated frequently, CH2M HILL agrees that the use of the ENR CCI Seattle index is probably the most appropriate method of updating estimates to current dollars. The unit costs in the program, as established and updated by Task #1, are in September, 2005 (Seattle ENR index 8390) dollars. Indices are used by dividing the current index number by the index of the month and year that a project was built or previously estimated. This results in a factor to multiply the past project cost by.

The future escalation factor default in Tabula is 3% per year, based on past ENR CCI index trends, with the option of using another more appropriate percentage, if desired. This factor is then compounded times the number of years into the future that the project will be constructed. For example, the formula to escalate a project at 3% per year into the future for 5 years would be  $(1.03)^5$  equals 1.159. The current cost is then multiplied by this number.

Finding a factor to use for projecting a project estimate to the future is a more difficult task than bringing past cost to current dollars because the economy in the future is uncertain. Several sources were evaluated for comparison and appropriateness for current and future cost factors for Tabula. Those sources were ENR CCI and BCI for 20-City average and Seattle, Bureau of Reclamation, *RS Means* and *Marshall & Swift*. This information is shown in Appendix A. The indices from these sources were evaluated to five years in the past.

There were several reasons for analyzing a five year interval instead of ten years for recommending this future escalation factor. The first, is that five years is what was used to develop the annual escalation factor currently used in the Tabula program. Secondly, a ten year interval was considered for this purpose. That average annual escalation rate was calculated to be 3.4% per year. After further thought about the events of the last five years that have impacted the construction industry, it was determined that a five year interval was a better representation of the escalation rate that we might reasonably expect in the foreseeable future. Some of the more significant events that have occurred in that time frame are the September 11, 2001 bombing of the World Trade Center in New York, the dramatic price increases for steel and cement resulting from the economic boom in China, the tsunami in the Middle East, rising oil and gas prices, the multiple hurricanes in the gulf coast region and the earthquake in Pakistan of 2005. All of these events will have an impact on the construction industry. The degree and duration of the impact is unknown. The ten year evaluation had a moderating effect on the annual rate that CH2M HILL did not feel was realistic for the near term in regards to escalation. The other reasons for this choice were that the Tabula user can, if deemed appropriate, override the escalation default factor with a more appropriate factor within the program. Also, with a regular maintenance program on Tabula, the default factor can be modified based on more current information in the future.

Table 1 shows the average annual change of the sources evaluated, shown in Appendix A, over the last five years. The average of these sources equates to 3.8% annual escalation rate. CH2M HILL recommends using 3.8% as the default to calculate future escalation costs for Tabula. Future attention should be given to subsequent Seattle ENR CCI index numbers to evaluate continued reality of this default factor.

**Table 1. Average Annual Escalation**

<b>Source</b>	<b>Average Annual Change</b>
ENR CCI Seattle	3.2%
ENR CCI 20-City Average	3.9%
ENR BCI Seattle	3.6%
ENR BCI 20-City Average	3.7%
Bureau of Reclamation	3.2%
RS Means	4.7%
Marshall & Swift	4.2%
<b>Average Rate</b>	<b>3.8%</b>

## Appendix A. Escalation Changes over the Last Five Years

### ENR CCI Seattle

Year	Index	% Chg
Sep-00	7154	
Sep-01	7333	2.5%
Sep-02	7572	3.3%
Sep-03	7842	3.6%
Sep-04	8117	3.5%
Sep-05	8390	3.4%
	<b>Average Annual</b>	<b>3.2%</b>

### ENR CCI 20-City Average

Year	Index	% Chg
Sep-00	6224	
Sep-01	6391	2.7%
Sep-02	6589	3.1%
Sep-03	6741	2.3%
Sep-04	7298	8.3%
Sep-05	7540	3.3%
	<b>Average Annual</b>	<b>3.9%</b>

### ENR BCI Seattle

Year	Index	% Chg
Sep-00	3607	
Sep-01	3707	2.8%
Sep-02	3750	1.2%
Sep-03	3865	3.1%
Sep-04	4159	7.6%
Sep-05	4297	3.3%
	<b>Average Annual</b>	<b>3.6%</b>

### ENR BCI 20-City Average

Year	Index	% Chg
Sep-00	3539	
Sep-01	3597	1.6%
Sep-02	3655	1.6%
Sep-03	3717	1.7%
Sep-04	4103	10.4%
Sep-05	4242	3.4%
	<b>Average Annual</b>	<b>3.7%</b>

### *RS Means*

Year	Index	% Chg
Jul-00	120.9	
Jul-01	125.1	3.5%
Jul-02	128.7	2.9%
Jul-03	132.0	2.6%
Jul-04	143.7	8.9%
Jul-05	151.6	5.5%
	<b>Average Annual</b>	<b>4.7%</b>

### *Marshall & Swift Cost Index*

Const Type	Oct-00	Annual
Class A	22.0%	4.4%
Class B	21.8%	4.4%
Class C	19.8%	4.0%
Class D	20.3%	4.1%
Class S	21.7%	4.3%
	<b>Average Annual</b>	<b>4.2%</b>

**Appendix A (Cont'd). Escalation Changes over the Last Five Years**  
**Bureau of Reclamation**

Mth-Yr	Oct-00	Oct-01	Oct-02	Oct-03	Oct-04	Oct-05	Category Annual Average	Overall Average Annual	
Tunnels	251	256	261	268	288	297	3.4%	3.2%	
% Chg		2.0%	2.0%	2.7%	7.5%	3.1%			
Concrete Pipelines	223	231	237	244	256	265			
% Chg		3.6%	2.6%	3.0%	4.9%	3.5%	3.5%		
Steel Pipelines	250	257	264	271	287	291			
% Chg		2.8%	2.7%	2.7%	5.9%	1.4%			
Pumping Plants							3.1%		
	Elect & Misc	235	240	247	254	267			271
	% Chg		2.1%	2.9%	2.8%	5.1%			1.5%
Pumping Plants							2.9%		
	Pumps & Pr Movers	247	252	257	261	272			281
	% Chg		2.0%	2.0%	1.6%	4.2%			3.3%
Pumping Plants							2.6%		
	Equip	242	247	253	258	270			277
	% Chg		2.1%	2.4%	2.0%	4.7%			2.6%
Pumping Plants							2.7%		
	Strs & Impvts	224	228	233	240	262			271
	% Chg		1.8%	2.2%	3.0%	9.2%			3.4%
Pumping Plants							3.9%		
	Pumping Plants	231	235	241	247	263			272
	% Chg		1.7%	2.6%	2.5%	6.5%			3.4%
							3.3%		

